

WHAT IS CLAIMED IS:

- 1           1.     An apparatus comprising:
- 2                 a wave plate having wave plate states, wherein the wave plate
- 3 propagates light with a resulting polarization dependent on which of the wave plate
- 4 states the wave plate is in; and
- 5                 an imager having states, wherein the imager propagates the light from
- 6 and to the wave plate with a resulting other polarization dependent on which of the
- 7 imager states the imager is in, the imager imparting information on the light.
- 1           2.     The apparatus of claim 1 further comprising a reflector that reflects the
- 2 light from and to the imager.
- 1           3.     The apparatus of claim ~~2~~, wherein the reflector comprises a mirror.
- 2
- 1           4.     The apparatus of claim 1, wherein the wave plate comprises an odd
- 2 multiple quarter-wave plate.
- 1           5.     The apparatus of claim 1 wherein the imager comprises cells each
- 2 having cell states, wherein the imager propagates the light with the resulting other
- 3 polarization dependent on which of the cell states each of the cells is in.
- 1           6.     The apparatus of claim 1, wherein transitions occur between the imager
- 2 states and transitions occur between the wave plate states.

1           7.     The apparatus of claim 1, wherein the wave plate comprises a single  
2     cell.

1           8.     The apparatus of claim 1, wherein the imager comprises a liquid  
2     crystal.

1           9.     The apparatus of claim 8, wherein the wave plate compensates for DC  
2     balancing of the liquid crystal.

1           10.    The apparatus of claim 1, wherein the imager states comprise liquid  
2     crystal states.

1           11.    The apparatus of claim 1, wherein the imager alternates between the  
2     imager states in response to DC balancing, and wherein the wave plate transitions  
3     between the wave plate states to compensate for the change in the imager states.

1           12.    The apparatus of claim 11, wherein the wave plate transitions between  
2     the wave plate states and the imager transitions between imager states synchronously.  
3

1           13.    The apparatus of claim 1, further comprising a polarizing reflector that  
2     reflects the light from and to the imager.

1           14.    The apparatus of claim 1, further comprising a polarizing beam splitter  
2           that reflects the light from and to the imager.

1           15.    The apparatus of claim 1, further comprising a reflector, wherein the  
2           wave plate is configured to transmit light to the imager and to receive light from the  
3           imager, and wherein the imager is configured to receive light from the wave plate and  
4           to transmit light to and from the reflector.

1           16.    The apparatus of claim 1, wherein the imager comprises a ferroelectric  
2           liquid crystal.

1           17     The apparatus of claim 1, wherein the wave plate comprises a  
2           ferroelectric liquid crystal.

1           18.    The apparatus of claim 1, wherein the wave plate in one of the wave  
2           plate states retards the light by a total of approximately  $\lambda/2$  in a double pass.

1           19.    The apparatus of claim 1, wherein the imager retards in one of the  
2           imager states retards the light by a total of approximately  $\lambda/2$  in a double pass.

1           20.    The apparatus of claim 1, wherein the wave plate comprises a  
2           compensator.

1           21.    The apparatus of claim 1, wherein the wave plate comprises a one-  
2   quarter wave compensator configured to propagate the light to and from the imager.  
3

1           22.    The apparatus of claim 1, wherein the information comprises cell  
2   information. ~~X~~

1           23.    The apparatus of claim 1, wherein the information comprises  
2   polarization information

1           24.    A method of compensating in an optical system comprising:  
2   providing polarized light;  
3   retarding the polarized light;  
4   imparting information on the retarded polarized light;  
5   reflecting the retarded polarized light; and  
6   further retarding the reflected and retarded polarized light.

1           25.    The method of claim 24 wherein providing polarized light comprises  
2   reflecting light off of a polarized reflector.

1           26.    The method of claim 24, wherein further retarding forms an output  
2   light, the method further comprising transmitting the output light through a polarizing  
3   reflector.

1           27.    The method of claim 24, wherein retarding the polarized light  
2    comprises retarding by an odd multiple of one-quarter of the wavelength of the  
3    polarized light.

1           28.    The method of claim 24 wherein retarding and further retarding  
2    comprise retarding and further retarding within the same device.

1           29.    An apparatus comprising:  
2           a reflective mode imager having imager states, the imager retarding light  
3    transmitted by the imager depending on the state of the imager;  
4           a compensator having compensator states, the compensator configured to  
5    provide light to the imager and to receive light reflected through the imager, the  
6    compensator retarding light transmitted by the compensator depending on the state of  
7    the compensator; and  
8           a polarizer configured to receive light and to provide a portion of the received  
9    light to the compensator. ~~A~~

1           30.    The apparatus of claim 29, wherein the polarizer is further configured  
2    to receive light from the compensator and to provide a portion of the light received  
3    from the compensator as output light depending on the state of the imager and on the  
4    state of the compensator.

1           31.    The apparatus of claim 29, wherein the polarizer comprises a reflecting  
2    polarizer.

1        32.    An apparatus comprising:  
2        an imager having a first imager state and a second imager state, the imager  
3        configured to:  
4        propagate light,  
5        rotate polarization of the light propagated by the imager when the imager is in  
6        the first imager state, and  
7        not rotate polarization of the light propagated by the imager when the imager  
8        is in the second imager state; and  
9        a compensator having a first compensator state and a second compensator  
10       state, the compensator configured to:  
11       propagate light to and from the imager,  
12       rotate polarization of the light propagated by the compensator when the  
13       compensator is in the first compensator state, and  
14       not rotate polarization of the light propagated by the compensator when the  
15       compensator is in the second compensator state.

1        33.    The apparatus of claim 32, wherein the apparatus further comprises  
2        modes, wherein the apparatus is in one mode when the imager and the compensator  
3        are one of both in their respective first states and both in their respective second states,  
4        and wherein the apparatus is in another mode when the imager and the compensator  
5        are one of not both in their respective first states and not both in their respective  
6        second states.

1           34.    The apparatus of claim 32, wherein the first imager state and the first  
2   compensator state comprise on states, and wherein the second imager state and the  
3   second compensator state comprise off states.

1           35.    The apparatus of claim 32, wherein the imager and the compensator  
2   make state transitions between their respective first and second states in synchrony.  
3

1           36.    The apparatus of claim 32, wherein the compensator makes state  
2   transitions between its first and second states to compensate for DC balancing of the  
3   imager. *A*

1           37.    The apparatus of claim 32, wherein the apparatus produces output light  
2   depending on which of the first and second imager states the imager is in and on  
3   which of the first and second compensator states the compensator is in.

1           38.    The apparatus of claim 32, wherein combinations of the first and  
2   second imager states and the first and second compensator states result in light output  
3   representative of exclusive-OR functionality.

1           39.    The apparatus of claim 32, wherein a complementary pair is formed for  
2   the imager and the compensator being switched between their respective first states  
3   and their respective second states.

40. The apparatus of claim 32, wherein a complementary pair is formed for the imager being switched between the first imager state and the second imager state and the compensator being switched between the second compensator state and the first compensator state.

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